

Control of Spontaneous Emission by Photonic Crystals

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Control over spontaneous emission of light is essential to quantum optics and to diverse applications such as miniature lasers, LEDs, and single-photon sources for quantum information. Such manipulation not only entails directional spectral changes, but also direction-independent changes of the rate of emission or of the lifetime. The first observation of such emission control with photonic crystals was recently made following the original prediction by Yablonovitch [*Nature* **430** (2004) 654-657], and it is exhilarating that new realizations arise, also in 2D photonic crystal slabs.

In this presentation, we will discuss various physical aspects of this fundamental subject, illustrated mostly from our work on quantum dots in inverse opals. Examples are the role of an ensemble of light sources, the intricacies of various sources, a comparison between bulk photonic crystals and defect-cavities, and a comparison to theories that typically consider a single two-level atom.